In-Office Cost System (IOCS) Documentation

I. PREFACE

A. Purpose and Content

USPS-FY14-37 documents the In-Office Cost System, including statistical design for and estimation of in-office labor costs. It also presents FY14 CVs and confidence intervals for the estimates.

B. Predecessor Document

Documentation of statistical design and estimation were provided previously in Docket No. R2006-1, USPS-LR-L-9 and ACR2013, USPS-FY13-37.

C. Corresponding Non-Public Document

USPS-FY14-NP21, In-Office Cost System (IOCS) Documentation.

D. Methodology

For FY14, IOCS methodology is the same as described in Docket ACR2013: USPS-FY13-37, except for the changes listed below.

The encirclement rules for USPS Tracking (Delivery Confirmation) have been updated to reflect Order 2180, Proposal Eight. For all products with tracking, activities related to delivery are no longer encircled to the Tracking Extra Service, resulting in changes to program ALB080. For those remaining products (First-Class Parcels and Media Mail) where Tracking can still be purchased as an additional Extra Service at the window, data from the Point of Service (POS) system is used, resulting in changes to program ALB103. A portion of window acceptance costs is shifted from the parent product to the Tracking Extra Service in proportion to the percentage of POS transactions of the product where Tracking was also purchased.

An adjustment was made to account for change in markings of Standard Mail. Some flats mailings that paid carrier route prices received permission to use “FSS” instead of “ECR” carrier route markings and to use STIDs in barcodes indicating Standard Regular rather than carrier route. Luckily, beginning in FY14, IOCS records the presence of the “FSS” marking on mailpieces. Data from PostalOne on the rate composition of FSS bundles is used to split the costs associated with Standard Mail “FSS”-marked pieces into Standard Regular Flats, ECR-Basic and ECR-HD/WSS in proportion to volume.

E. Input/Output

Cost estimates from the In-Office Cost System rely on no input data. Outputs from the In-Office Cost System are used as inputs to:

USPS-FY14-1	• FY 2014 Public Cost Segments and Components Report
USPS-FY14-7	• Cost Segment 3 Cost Pools & Other Related Information (Public Portion)
USPS-FY14-19	• FY 2014 Delivery Costs By Shape
USPS-FY14-31	• FY 2014 CRA Model (Model Files, Cost Matrices, and Reports) (Public Version)
USPS-FY14-32	• FY 2014 CRA "B" Workpapers (Public Version)

II. ORGANIZATION

This document describes the statistical design of IOCS, and provides information on the system's programs. Electronic data files, programs, data dictionary, flowchart and CVs are provided in the accompanying CD, described in Appendix A.

III. OVERVIEW

The In-Office Cost System (IOCS) is a continuous, ongoing probability sample of work time to estimate costs of various activities performed by clerks, mail handlers, city carriers, and supervisors. Although the Postal Accounting system tracks costs for various categories of employees, it does not identify labor costs by product because employees are simultaneously processing more than one product in most operations. The IOCS is designed to supplement the accounting system data by sampling employees at randomly selected points in time throughout the year. When an employee is sampled, the activity of the employee at that point in time is recorded directly into a laptop computer using the IOCS Computerized On-Site Data Entry System (IOCS-CODES) software.

These sample data, in combination with data from the accounting system and the MODS system, are used to produce detailed estimates of attributable costs for various activities.

A. Use of IOCS Data in Distribution of Costs to Mail Categories

IOCS estimates are used to distribute volume variable costs to products for cost segments 3 (clerk/mail handler-CAG A-J Post Offices), 4 (clerks - CAG K Post Offices), and 6 (city carrier, in-office). The data are generally tabulated at the "cost pool" level for costing purposes; see USPS-FY14-7.

B. Other Uses of IOCS Data for Costing

Cost estimates from the IOCS are also used to develop accrued costs for segment 2 (supervision of mail processing, window service, admin support…), segment 6 (city carrier in-office), and segment 7 (city carrier street time). For example, the accounting system provides total accrued costs of city carriers (Cost Segments 6 and 7 combined), and an IOCS estimate of the proportion of city carrier cost while in the office is used to split accrued costs between segments 6 and 7.

In addition, the distribution of volume variable costs in other segments and components relies indirectly on IOCS. For example, volume variable rental costs for window service space are distributed as window service in segment 3.2, and the volume variable costs of segment 3.2 are distributed to products based on IOCS estimates.

Documentation for the In-Office Cost System provided in USPS-LR-L-9, Docket No. R2006, included complete programs and descriptions of field data collection processes and data editing. Those programs and descriptions have incurred no substantive changes and are not reproduced herein. Sample selection programs have been converted from COBOL to SAS, and are provided on the accompanying CD.

IV. STATISTICAL STUDY DESIGN

The universe under study in IOCS consists of all the work time, during a Fiscal Year, of all employees in four employee crafts: 1) Clerks, 2) Mail Handlers, 3) City Carriers, and 4) Supervisors.[1] The IOCS is a three-stage probability sample of employee work time, stratified by employee craft and by Cost Ascertainment Group (CAG). The details for each of the stages are described below:

A. First Stage Sample

The first stage sampling unit is a finance number, or post office. The IOCS office frame consists of all finance numbers which contain employees eligible for sampling in IOCS. Finance numbers are stratified by size into CAGs, where the measure of size for each office is its total revenue receipts two years previous. The office frame consists of finance numbers whose CAG status is at K or above. The Network Distribution Centers (NDC) and processing and distribution facilities (P&DC, AMC, AMF and some P&DF) are considered as part of the stratum of largest (CAG A and B) offices.

All offices that were in CAG A or CAG B prior to 1992 and remained in CAGs A or B are included in the sample. In each of the other CAGs a panel of offices is used to represent the office frame.

[1] This group includes professional, administrative and technical staff.

Table 1 summarizes the first-stage sample and universe sizes.

Table 1
First-Stage Universe and Sample

	Fiscal Year	
	2014	
	Office Frame	Sample Size
	Sum	Sum
CAG Group		
A/B	2,832	2,594
C	1,373	421
D	816	131
E	1,576	84
F	2,160	63
G	2,931	104
H/J	3,885	169
K	91	4
Total	15,664	3,570

B. Second Stage Sample

The second stage sampling unit is the employee-week. Employees are stratified by craft within CAG. Sampling rates are specific to craft-CAG combinations. In order to generate more accurate cost estimates for international products, clerks and mail handlers in offices with high volumes of international mail are sampled at higher rates. Within each office, a higher sampling rate is assigned to a group of pay locations with a historically higher incidence of handling international mail. This is offset by reducing the employee sampling rate for the rest of the pay locations in that office. For FY2014, 21 offices were identified for this procedure. For these offices, the weekly employee sampling rates ranged from 0.02 to 0.50, as compared to the default rate of 0.03 for CAG A clerks and mail handlers.

Table 2 summarizes the employee sampling rates and Table 3 shows the FY 2014 sample sizes by craft and CAG group.

Table 2
Employee Sampling Rates by CAG and Employee Craft

	CRAFT					
CAG	Clerk - Regular	Clerk - Other	Mail-Handlers	City Carrier - Regular	City Carrier - Other	Super-visors
A/B & NDCs	.03	.03	.03	.024	.024	.04
C	.09	.09	.09	.073	.073	.10
D	.17	.17	.17	.138	.138	.10
E	.24	.24	.24	.194	.194	.16
F	.50	.50	.50	.405	.405	.40
G	.50	.50	.50	.405	.405	.50
H	.50	.50	.50	.405	.405	.50
J	.50	.50	.50	.405	.405	.50
K	.50	.50	.00	.00	.00	.00

Table 3

Fiscal Year 2014
Unweighted Tallies
Excludes Generated Records

NOTE: BF4 includes nonscheduled leave, samples not received, at lunch, etc.

Table of Craft by CAG

	CAG									
	A/B	C	D	E	F	G	H/J	K	PRB	Total
	N	N	N	N	N	N	N	N	N	N
Craft										
Supervisor	16,492	3,836	1,104	835	551	239	131	.	.	23,188
Supervisor BF4	11,734	2,584	731	553	405	144	113	6	.	16,270
Clerk-Reg	55,583	10,960	5,049	4,553	1,767	905	995	.	1	79,813
Clerk-Reg BF4	61,294	9,471	4,760	4,380	1,875	1,028	960	.	1	83,769
Clerk-Sub	10,478	1,808	724	790	1,337	1,914	2,503	36	6	19,596
Clerk-Sub BF4	13,009	1,636	849	1,027	1,521	2,371	3,427	29	21	23,890
Mail Handler	36,954	814	120	307	.	.	.	.	.	38,195
Mail Handler BF4	46,142	861	99	229	.	.	.	.	.	47,331
Carrier-Reg	47,102	28,846	14,052	9,794	4,171	1,424	925	.	4	106,318
Carrier-Reg BF4	34,883	20,270	10,693	7,122	3,099	939	637	.	.	77,643
Carrier-Sub	11,067	6,793	3,048	2,412	1,437	859	705	.	1	26,322
Carrier-Sub BF4	8,023	4,440	2,249	1,804	1,048	933	848	.	.	19,345
Total	352,761	92,319	43,478	33,806	17,211	10,756	11,244	71	34	561,680

C. Third Stage Sample

The third stage of selection is the instant of time, within the selected week, for which the employee is scheduled for observation. Within the selected week, a day is first selected randomly with the probability proportional to the number of employees who work that day. The selection probabilities are 15/90 for a regular working day (Monday to Friday), 11/90 for Saturday, and 4/90 for Sunday. Then, within the selected day, the employee's scheduled reading period is determined by a random selection of a two-hour interval (first, second, third, or last) over the employee's actual tour of duty. For supervisors, clerks, and mailhandlers, the probability of selection is (5/21, 5/21, 5/21, 6/21) respectively. For carriers, the probability of selection is (5/17, 5/17, 1/17, 6/17). Finally, a random time is selected within the selected interval with a probability of 1/120.

D. Cost Estimation

The IOCS cost weighting factor is derived from standard design-based weights and national level accrued quarterly cost data for the crafts eligible for IOCS sampling. The cost weighting factor is constructed so that weighted sums of IOCS data produce cost estimates consistent with trial balance accrued costs by quarter.

1. Design Based Weight

The design based weights, W_{hijk}, are developed from the sampling design:

$$W_{hijk} = \frac{1}{P_h} * \frac{1}{P_{hijk}} * \frac{1}{P_D} * \frac{1}{P_R} * \frac{1}{P_T}$$

where

P_h = n_h / N_h , the ratio of sample offices, n_h, to total offices, N_h, for CAG h

P_{hijk} = weekly sampling rate for employee k at pay location j, craft i, CAG h,

P_D = selection probability for the day of week

P_R = selection probability for the reading period

P_T = selection probability for the instant of time for observation

W_{hijk} = design based weight for employee k at pay location j, craft i, CAG h

2. Cost Weighting Factor

The cost weighting factor "COST-BASED WEIGHT" is a dollar weight. Total accrued cost for the stratum is distributed to each employee in proportion to the employee's design weight relative to the total design weight for the stratum.

$$CW_{hijk} = \frac{W_{hijk}}{\sum_j \sum_k W_{hijk}} C_{hi},$$

where
CW_{hijk} = cost-based weight for employee k at pay location j, craft i, CAG h, and C_{hi} = accrued cost for craft i, CAG h,.

3. The Heavy/Light Weight

For computational purposes, a relative or scaled design based weight, the Heavy/Light weight, is saved on the data record and used for computing the cost weighting factor. The Heavy/Light weight is the ratio of the design weight W_{hijk} to a standard weight.[2] Its value is one for regular observations, and varies for observations which were selected with probabilities different than the standard probability within a CAG/Craft group. For example, if employees in a particular CAG/Craft group are normally selected with probability 0.03, but employees in one pay location are selected with probability 0.06, then the heavy/light weight for employees in that pay location would be ½, since weights are the reciprocals of the probabilities of selection.

As shown below, the use of this heavy/light weight rather than the design weight does not affect the value of CW_{hijk}, since the standard weight is the same for all observations within a CAG/Craft group.

Let
W_{hi}^{s} = the standard weight for CAG *h* craft *i*, and
$W_{hijk}^{*} = W_{hijk} / W_{hi}^{s}$ = the heavy/light weight.
Then substituting W_{hijk}^{*} for W_{hijk} in the formula for CW_{hijk}, above, yields

$$CW_{hijk} = \frac{W_{hijk}^{*}}{\sum_j \sum_k W_{hijk}^{*}} C_{hi} = \frac{(W_{hijk} / W_{hi}^{s})}{\sum_j \sum_k (W_{hijk} / W_{hi}^{s})} C_{hi} = \frac{W_{hijk}}{\sum_j \sum_k W_{hijk}} C_{hi}.$$

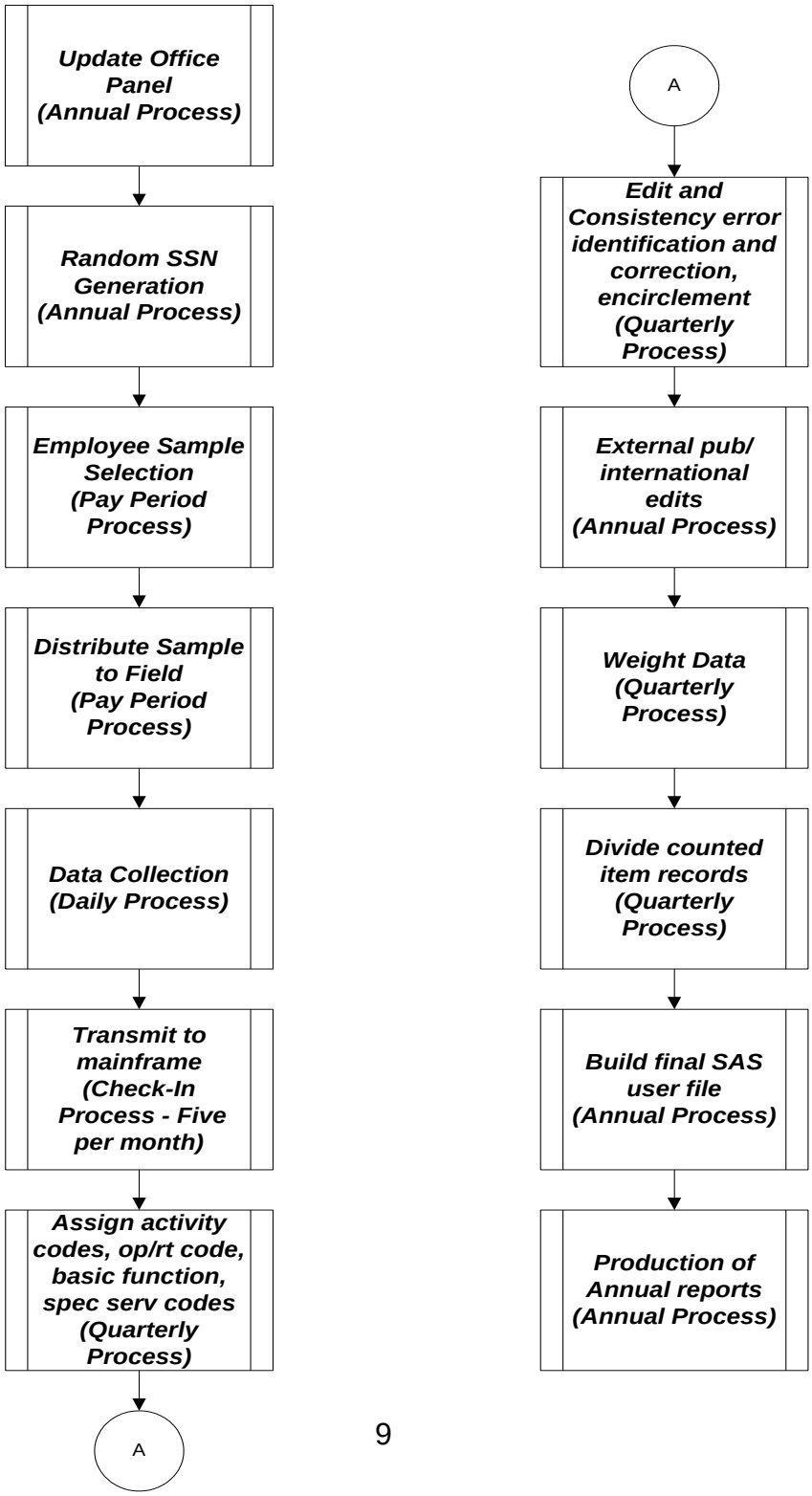
The method of estimation assumes that the sample of offices in each CAG constitutes an equal probability sample. It also assumes nonresponse is random, or independent of what is being estimated, and can therefore be regarded as constituting a simple reduction in sample size.

[2] The standard weight for an observation that is tabulated in CAG H refers to the design weight of an observation sampled at a CAG H facility without pay location over-sampling, with reading number 1, 2, or 3, and scheduled for Monday to Friday.

V. SYSTEM FLOWCHART

The IOCS processing flow consists of many processes that occur at various frequencies throughout the year. The following flowchart diagrams the order of major processing steps and their frequency within an annual processing cycle.

IOCS System Flowchart



VI. PROGRAM DOCUMENTATION

The programs that assign activity codes, basic function, operation/route codes and that perform cost estimation are documented in this section. Copies of the SAS programs and JCL are provided electronically on the accompanying CD.

ALB040 - Program

The central function of this program is to assign initial four-digit activity codes for labor activities or products and to assign up to five special service codes. In addition, it assigns initial basic function and operation/route codes.

Inputs are:

- IOCS tally data;
- Periodicals data (ISSN, Publication No.);
- ZIP Code to County mapping;
- Postal Rates;
- Barcode Service Type Code mappings.

Output is a file of IOCS tally data with activity code, basic function and operation/route codes assigned, and with coded extra services.

ALB060 - Program

The main function of this SAS program is to perform edit and consistency checking. It checks the validity of certain data and checks certain related fields within the record for consistency. Records that fail the checks are assigned an error code and written to an error file for later correction, while remaining records are written to a “clean records” file. This program is applied several times in an iterative cycle with program ALB078.

Inputs are:

- IOCS tally data, either from ALB040 or from ALB078;
- Finance numbers in the IOCS panel;
- Tables of activity codes, extra service codes, operation/route codes, and country codes.

Output consists of two files, one with tallies that are clean, and one with tallies with data inconsistencies to be resolved.

ALB078 - Program

This is a SAS error correction program. Its purpose is to resolve data inconsistencies that lead to the error codes assigned by ALB060. It is applied several times in an iterative cycle with program ALB060.

Input is the file of tallies with data inconsistencies from ALB060. Output is a file of these tallies with updates and corrections.

ALB080 - Program
This program applies encirclement rules, assigning costs to extra services when appropriate. The previous activity code of the parent piece is overwritten, replaced by the activity code of the encircled extra service.

Inputs are the files of tallies output from programs ALB060 and ALB078.

Outputs are the IOCS tallies with activity codes encircled when appropriate, in both SAS and flat files.

External review
Tallies are also reviewed externally. These checks include: validation of Periodicals titles; specialized validation of international mail checking postage, markings and barcodes; validation of data using scanned barcodes, and review of anomaly log entries.

ALB101 Program
The central purpose of this program is to produce IOCS cost weighting factors. It also merges in the results of the external international edit and the external Periodicals review, and performs corrections to some activity codes. The IOCS cost weighting factor is derived from standard design-based weights and national level accrued quarterly cost data for the crafts eligible for IOCS sampling. The cost weighting factor is constructed so that weighted sums of IOCS data produce cost estimates consistent with trial balance accrued costs by quarter.

Inputs are:

IOCS tally files that were output from program ALB080;
List of finance numbers with corresponding CAG/Finance group codes;
List of finance numbers with updated CAG and weighting factors;
Files of Post Office accrued expense data by craft and CAG;
Periodicals tallies after external review;
International tallies after external review;
Edited tallies from external review of barcode scans;
Edited tallies from external review of anomaly log;
Sampling rate data used in sample selection for regular offices;
Sample rate data used in sample select for heavy/light offices;
Tallies of supervisors with automatically coded activity codes.

Outputs are:

IOCS tally files with cost weights assigned and with edits and automatically assigned activity codes incorporated;
File of dollar values by shape for products with mixed mail costs distributed in ALB103.

ALB103 - Program
SAS program, ALB103 is executed to 1) generate IOCS records representing counted mixed mail for counted items, 2) split costs related to Tracking purchased at the window,

3) split costs related to pieces with “FSS” markings, and 4) add detailed international activity codes.

Inputs are:

IOCS tally file from ALB101;
Detail data records for counted mixed mail;
Costs by product and shape from ALB101;
Volume data from POS for products with and without purchased Tracking;
Volume data from PostalOne for Standard rate categories in FSS bundles.

Outputs are the IOCS tallies with additional records for counted mixed mail, with updates for records split using POS or PostalOne data, and with additional detail for international tallies. This output is in SAS and flat files.

ALB106 - Program

This program reformats and summarizes the IOCS tally data into the form required by the CARMM procedure. It also produces several craft level reports for input into CRA spreadsheets.

The summary output file drops basic function 4 records, then summarizes tallies and dollars for groups defined by CAG, Finance Grouping, craft code designation, operation/route code, basic function, and activity code.

CS2SUPV - Program

This program produces a report on split supervisor activity codes. The results are input to the C/S 2 spreadsheets.

- There are two analyses of activity code 7470 (supervision of mixed clerk/mail handler activities). The first reports on certain activities that should *not* be included—i.e., carrier activities (Q15D), other craft-level employees (Q15F), and no craft-level employees (Q15G). If none of these are found, “NO OTHERS” will be 100.0 percent. The second analysis is used to reallocate a portion of 7470 to mail processing, window, and administrative activities (Q15E1, Q15E3).

- An analysis of activity code 7635 (supervision of two or more clerk/mail handler activities) verifies that very few tallies include administrative/other activities (Q15E1) or other craft-level employees (Q15F).

- There are two analyses of activity code 7637 (supervision of clerks/mail handlers and at least one carrier). The first analysis determines the proportions of the various activities assigned to mail processing, window and admin (Q15E1,Q15E3,Q15F,Q15G). The second analysis narrows the mail processing activities to bulk mail acceptance, collection/preparation, processing/distribution, and miscellaneous (Q15E1).

CS3EQUIP - Program

This program develops distribution keys for mail processing equipment and training. The program selects all tallies for which:

- Employee is a clerk or mail handler
- Employee is not at a CAG K office
- Employee is assigned a direct mail activity code
- Employee is in a mail-processing related operation

The selected records are divided into types of equipment being used, type of manual operation being performed, NDC, parcels, and other mail processing activities. They are then assigned to product based on activity code, and reports are written.

ALBCARMM - Program

The function of the City **Car**rier **M**ixed **M**ail (CARMM) Cost Distribution System is to distribute mixed mail costs to direct mail activity codes and to produce a variety of summary reports as output. The inputs are: 1) cost data summarized by ALB106; 2) a table mapping direct mail activity codes to mixed mail codes.

APPENDIX A: IOCS CD-ROM CONTENTS

The associated CD-ROM contains the following.

1. Directory Data\ contains the IOCS dataset, both a PC-SAS dataset, PRCPub14.sas7bdat, and a flat file, PRCPub14Flat.dat, and a macro to read the flat file, PRCPUB_FLTFMT.txt. It also has file SPLTPARM, which has POS volumes with and without paid Tracking for each eligible product, and PostalOne volumes by rate category within FSS bundles.

2. Directory SASPrograms\ contains the SAS programs used to assign activity codes, basic function and operation/route numbers, and to estimate costs.

3. Directory JCL\ contains the JCL used to run the SAS programs.

4. Directory ALB\HQ624D01\ contains the total dollars by craft and CAG that are distributed by IOCS.

5. File IOCSDataDictionaryFY14.xls describes the variables in the IOCS data files.

6. File MASTER.CODES.FY14 is a list of codes used in IOCS.

7. File ReadPRCPubOutput.txt is the output of a program that lists the variables in the PRCPub14 dataset and prints the contents of 10 records.

8. File IOCSDataEntryFlowchartFY14.xls is the flowchart describing the CODES software survey instrument.

9. File “IOCS CVs FY14 Public.xlsx” has the IOCS CVs.

Note: The data file contains data elements of the IOCS data file used for the development of the Fiscal Year 2014 CRA. It was developed by dropping variables not used in development of the CRA, and recoding variables containing sensitive information.

The following variables were recoded:

Field F1 - the second character of F1 (area identifier) has been recoded.
Field F2 - finance number has been recoded.
Field Q01 - employee identification number has been recoded.